Is birthing pain the trigger of postpartum depression?

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Background

In 2007 the International Association for the Study of Pain (IASP) launched the campaign "Real Women, Real Pain"; 2007-2008 was declared as the "Global Year Against Pain in Women. By then it was recognized that 90% of women experience severe/unbearable labor pain, and that one very real consequence to labor pain was psychological: "Long-term emotional stress with potential adverse consequences on maternal mental health and family relationships" [1]. One year later Eisenach and his colleagues published their seminal data on the association between acute pain and postpartum depression [2]. Eisenach conducted a multicentre study across North America and Western Europe, recruiting 1288 women after vaginal and cesarean delivery (CD). The reported combined incidence of acute pain 36 hours after delivery was 10.6%, and persistent pain at 8 weeks was 9.8%. Multivariable regression revealed a threefold increased risk of postpartum depression (PPD) in the presence of acute pain.

Rates of persistent pain after cesarean delivery (PPCD) is subject to debate [3]. On the lower end, Eisenach et al. reports PPCD as 1.8% at 6 months decreasing to 0.3% at 12 months [4]. On the other end of the spectrum, 20% of PPCD is reported 2 years after CD for breech lie [5]. Other studies report rates between 6-18% beyond 6 months postpartum [6-8]. Although vaginal birth is one of the most frequent significant life events in women, persistent pain after vaginal delivery (PPVD) is more difficult to quantify and correlate

across studies than PPCD, resulting in more limited data. One study reports an incidence of disabling PPVD in 2-5% of women two years after delivery [9]; another reports an incidence of 1% PPVD at one year [10]. Although the degree of pelvic trauma or episiotomy does not appear to correlate with PPVD at 6 weeks [3, 11, 12], the experience of assisted vaginal birth (vacuum extraction or forceps) seems to increase PPVD rates [5, 7, 13].

The prevalence of some degree of emotional disturbances in parturient women has been cited to be as high as 85% [14]. This almost equals the incidence of severe or unbearable pain during the birth process, which has been cited to be 90% [1]. The DSM-5 now categorizes PPD as a diagnosed depressive disorder with peripartum onset (within four weeks after delivery) [15]. The diagnosis of PPD still lacks a clear definition [16, 17], though it's prevalence is typically cited to be between 10-20% [18]. In western countries, most mothers leave the hospital 24-72 hours after delivery, typically before PPD would manifest. Most PPD is diagnosed in an outpatient setting, resulting in under-diagnosis of PPD. One study including 43,093 postpartum women has reinforced the rates of postpartum psychiatric illness, but also revealed low overall rates of pregnant and postpartum women seeking and/or receiving care for chronic or new mental health [19].

Discussion

Today only three prospective and one retrospective studies were able to detect a significant correlation between pain during the childbirth and PPD (table 1).

The study by Hiltunen et al was a prospective follow-up comparing 162 mothers during the fist postpartum week and at four months [20]. This study shows a positive correlation between analgesia and PPD one week after childbearing, but the study lacks a measured pain outcome. Additionally, the analysis differentiates by type of anesthesia provided, but doesn't account for quality of analgesia, constituting another serious limitation to this study.

The primary aim of Eisenach's prospective study was to explore the consequences of cesarean delivery on persistent pain at 8 weeks. This study revealed that the perceived severity of acute pain, but not the mode of delivery, was a significant risk factor for both persistent pain and postpartum depression [21]. Postpartum depression was actually a secondary outcome in this study. This may actually be a strength, since the focus on pain may help eliminate some confounding bias that has limited other studies.

The retrospective study by Gaudet et al is the largest dataset to date, correlating postpartum pain at 3 and 7.3 months to PPD (OR 1.7, 95% CI 1.2-1/5; OR 2.4, 95% CI 1.6-3.6, respectively) [22]. Again, this study was limited by lack of a precise pain measurement and no discrimination between types of analgesia offered during labor and delivery.

The most complete prospective study was conducted by Ding et al in Beijing, revealing an OR of 0.31 for PPD in subjects who received epidural analgesia during labor [21]. Epidural analgesia was the only available form of pain management during labor, so that was standardized and the study population was dichotomized between epidural and "no pain relief at all" groups. The statistical analysis accounted for significant confounding factors, including breastfeeding, Edinburgh Postnatal Depression Scale (EPDS) scores at 3 days postpartum and maximal pain scores during complete cervical dilation.

These four studies examine the association between PPD and severe pain during childbirth. Psychological and environmental factors for postpartum depression have been well described [17]. More recently, there is an acknowledgement by Wisner [23] who, in commenting on the study by Ding [21], reveals a possible psychological element also to biological factors that may be related to a link between PPD and childbirth pain.

One biological cause of PPD in susceptible women that is an area of intense research interest is the rapidly fluctuating levels of estrogen and progestogen occurring at birth [24]. Alternatively, exposure to oxytocin/oxytocin agonists during and after labor may reduce PPD. Gutierrez et al have shown in a rodent model that oxytocin has an analgesic effect during the puerperium [25]. It is now well established that oxytocin-induced nociception is mediated by a subpopulation of glutamatergic neurons amplifying GABAergic inhibition of pain [26]. One major drawback with oxytocin studies is that oxytocin does not cross the blood-brain barrier, but another oxytocin agonist, carbetocin, has been shown to have analgesic effects when

compared to oxytocin administration after cesarean delivery [27]. Recently intravenous carbetocin has shown anti-hyperalgesic effects in healthy volunteers [28]. All of these potential biologic links between peripartum pain and PPD seem to be influenced by the individual's perception and experience of pain, not just presence or degree of pain. This would certainly help account for cultural differences in management of pain and prevalence of PPD [28].

Conclusion

In the last 20 years obstetric anesthesia and analgesia has made a significant leap forward in understanding and treating pain during the birth process. Techniques for either epidural analgesia used during labor or neuraxial anesthesia administered for cesarean delivery have dramatically progressed, paralleled by a gain in popularity. 20 years ago the standard for pain management during labor was administration of nitrous oxide and general anesthesia for cesarean delivery. Today we understand that postpartum depression and pain during labor are two complex, multifactorial, and, to some degree, interrelated problems. Individually, each is considered a major health issue and investigators are now looking more closely on how peripartum pain and PPD are associated. Oxytocin, sometimes known as the "love hormone", is known to be an important promoter of mother-child bonding; perhaps it will also prove to be clinically useful in preventing or treating postpartum depression [29].

Although further work is needed in order to understand how pain and depression relate to each other, recent publications suggest that optimal desired pain control during the birth process may decrease the prevalence of postpartum depression. Improved attention to helping women achieve desired pain control during and after childbirth may have far-reaching benefits.

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Table 1: Overview of studies significantly correlating postpartum pain to postpartum depression

Year	Correlation of pain and postpartum depression	N	Groups compared	PPD	Acute pain during birth	PPD	Reference
2004	OR 0.25, (95%CI 0.09-0.72) for PPD at one week in analgesia group compared with no analgesia	162	-No analgesia (N=23) -Nitrous oxide or acupuncture (N=16) -Epidural or paracervical block (N=103) -Elective cesarean (N=32) -Emergency cesarean (N=11)	EPDS≥ 13	NA	13% at 4 months	[20]
2008	Every NRS point increase in acute pain is correlated to a 8.3% increase in 8-week EDPS p<0.001	1288	-Vaginal delivery (N=837) -Cesarean delivery (N=391)	EPDS>12	NRS 3.3 (SD 2.1) NRS 4.7 (SD 2.0)	11.2% at 2 months	[2]
2013	OR 1.7, (95%CI 1.2-1.5) for PPD if perinatal pain present at 3 months, OR 2.4, 95%CI 1.6-3.6 for PPD if problematic perineal pain at 7.3 months	5614	-Presence of problematic perinatal pain in the first 3 months -Duration of problematic perinatal pain -Number of types of perinatal pain at interview	EPDS ≥ 13	81.7% at 3 months	7% at 7.3months	[22]
2014	OR 0.31, 95%CI 0.12-0.82) for PPD in epidural group	214	-Labor epidural (N=107) -No labor epidural (N=107)	EPDS ≥ 10	NRS 3 (SD 0-7) NRS 10 (SD 7-10)	24.3% at 6 weeks	[21]

Table legend: OR= Odds ratio, CI=Confidence interval, PPD=Postpartum depression, N=Number cases, EPDS=Edinburgh postpartum depression scale, NRS=Numeric rating scale of pain, SD=Standard deviation, NA=Not available